

CLAIMS

We claim:

1. A method of real time reservoir management comprising the steps of:

(a) processing collected reservoir data in accordance with one or more predetermined algorithms to obtain a resultant desired production/injection forecast;

(b) generating a signal to one or more individual well control devices instructing the device to increase or decrease flow through the well control device;

(c) transmitting the signal to the individual well control device;

(d) adjusting the well control device in response to the signal to increase or decrease the production/injection of one or more selected production zones; and

(e) repeating steps (a) through (d) on a real time basis.

2. The method of reservoir management of Claim 1 further including the steps of:

allocating the production/injection forecast to selected producing zones in the reservoir;

calculating a target production/injection rate for one or more selected producing zones;

using the target production/injection rate in step (b) to generate the signal to the individual well control device; and

after the well control device is adjusted in step (d), comparing the target production/injection rate to the actual production/injection rate on a real time basis.

3. The method of reservoir management of Claim 1 further including the steps of:

pre-processing seismic data and geologic data according to a predetermined algorithm to create a reservoir geologic model; and

using the reservoir geologic model in calculating the desired production/injection rate.

4. The method of reservoir management of Claim 3 further including the steps of:

updating the reservoir model on a real time basis with at least one parameter selected from the group consisting of down hole pressure, flow and temperature data; and

processing the updated reservoir data according to a predetermined algorithm to obtain a desired production/injection rate.

5. The method of reservoir management of Claim 1 further including the steps of:

collecting real time data from one or more down-hole sensors from one or more wells and pre-processing said data using pressure transient analysis; and

using the resultant output in calculating the desired production/injection rate.

6. The method of reservoir management of Claim 1 further including the steps of:

collecting real time data from one or more seabed production installations for one or more wells and pre-processing said data using pressure transient analysis; and

using the resultant output in calculating the desired production/injection rate.

7. The method of reservoir management of Claim 1 further including the steps of:

collecting real time data from one or more surface production installations for one or more wells and pre-processing said data using computerized pressure transient analysis; and

using the resultant output in calculating the desired production/injection rate.

8. The method of reservoir management of Claim 1 further including the step of using nodal analysis according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

9. The method of reservoir management of Claim 1 further including the step of performing material balance calculations according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

10. The method of reservoir management of Claim 1 further including the step of performing risked economic analysis according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

11. The method of reservoir management of Claim 1 further including the step of performing reservoir simulation according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

12. The method of reservoir management of Claim 11 further including the step of selecting additional well locations based on the reservoir simulation model.

13. The method of reservoir management of Claim 1 further including the step of performing nodal analysis, reservoir simulation, material balance, and risked economic analysis according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

14. The method of reservoir management of Claim 1 further including the step of performing nodal analysis and reservoir simulation according to a predetermined algorithm on a real time basis in calculating the desired production/injection rate.

15. The method of reservoir management of Claim 14 wherein the step of performing reservoir simulation includes using data from the nodal analysis.

16. The method of reservoir simulation management of Claim 14 wherein the step of performing nodal analysis includes using data from the reservoir simulation.

17. The method of reservoir management of Claim 1 further including the step of performing iterative analyses of nodal analysis, material balance, and risked economic analysis on a real time basis according to a predetermined algorithm in calculating the desired production/injection rate.

18. The method of reservoir management of Claim 17 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a downhole control device and wherein the step of adjusting the well control device comprises the step of adjusting the down hole control device.

19. The method of reservoir management of Claim 17 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a surface control device and wherein the step of adjusting the

well control device comprises the step of adjusting the surface control device.

20. The method of reservoir management of Claim 17 wherein the step of generating a signal to a well control device comprises generating a signal for controlling a seabed control device and wherein the step of adjusting the well control device comprises the step of adjusting the seabed control device.

21. The method of reservoir management of Claim 1 further including the step of performing iterative analyses of nodal analysis, risked economic analysis, and reservoir simulation on a real time basis according to a predetermined algorithm in calculating the desired production/injection rate.

22. The method of reservoir management of Claim 1 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a downhole control device and wherein the step of adjusting the well control device comprises the step of adjusting the down hole control device.

23. The method of reservoir management of Claim 1 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a surface control device wherein and the step of adjusting the well control device comprises the step of adjusting the surface control device.

24. The method of reservoir management of Claim 1 wherein the step of generating a signal to a well control device comprises the step of generating a signal for controlling a seabed control device and wherein the step of adjusting the well control device comprises the step of adjusting the seabed control device.

25. A system for reservoir management comprising:

a processor for processing collected reservoir data in real time, generating a resultant desired production/injection forecast in real time and calculating in response to the desired forecast a target production/injection rate for one or more wells;

one or more sensors for obtaining reservoir data;

a data base accessible by the processor for storing the reservoir data;

said one or more sensors coupled to the data base for transmitting thereto the reservoir data for use by the processor in real time processing; and

a down hole production/injection control device that receives from the processor a signal indicative of the target production/injection rate.

26. The system for reservoir management of Claim 25 further including a surface production/injection control device that receives a signal from the processor.

27. The system for reservoir management of Claim 25 further including a sub sea sensor.

28. The system of reservoir management of Claim 27 further including a sub sea production/injection control device that receives a signal from the processor.

29. The system of reservoir management of Claim 25 further including a surface production/injection control device that receives a signal from the processor.

30. The system of reservoir management of Claim 25 wherein the one or more sensors includes a downhole sensor to collect data for pressure and temperature.

31. The system of reservoir management of Claim 25 wherein the one or more sensors includes a downhole sensor to collect data for fluid volumes for multiphase flow.

32. The system of reservoir management of Claim 25 wherein the one or more sensors includes a downhole sensor to collect data for 4D seismic.

33. The system of reservoir management of Claim 25 wherein the one or more sensors includes a surface sensor to collect data for fluid volumes for multiphase flow.

34. The system of reservoir management of Claim 27 wherein the subsea sensors collect data for fluid volumes for multiphase flow.

35. The system of Claim 25, wherein the one or more sensors includes a down hole sensor.

1974d	1974b	1974c	1974e	1974f	1974g	1974h	1974i	1974j	1974k	1974l	1974m	1974n	1974o	1974p	1974q	1974r	1974s	1974t	1974u	1974v	1974w	1974x	1974y	1974z	1975a	1975b	1975c	1975d	1975e	1975f	1975g	1975h	1975i	1975j	1975k	1975l	1975m	1975n	1975o	1975p	1975q	1975r	1975s	1975t	1975u	1975v	1975w	1975x	1975y	1975z	1976a	1976b	1976c	1976d	1976e	1976f	1976g	1976h	1976i	1976j	1976k	1976l	1976m	1976n	1976o	1976p	1976q	1976r	1976s	1976t	1976u	1976v	1976w	1976x	1976y	1976z	1977a	1977b	1977c	1977d	1977e	1977f	1977g	1977h	1977i	1977j	1977k	1977l	1977m	1977n	1977o	1977p	1977q	1977r	1977s	1977t	1977u	1977v	1977w	1977x	1977y	1977z	1978a	1978b	1978c	1978d	1978e	1978f	1978g	1978h	1978i	1978j	1978k	1978l	1978m	1978n	1978o	1978p	1978q	1978r	1978s	1978t	1978u	1978v	1978w	1978x	1978y	1978z	1979a	1979b	1979c	1979d	1979e	1979f	1979g	1979h	1979i	1979j	1979k	1979l	1979m	1979n	1979o	1979p	1979q	1979r	1979s	1979t	1979u	1979v	1979w	1979x	1979y	1979z	1980a	1980b	1980c	1980d	1980e	1980f	1980g	1980h	1980i	1980j	1980k	1980l	1980m	1980n	1980o	1980p	1980q	1980r	1980s	1980t	1980u	1980v	1980w	1980x	1980y	1980z	1981a	1981b	1981c	1981d	1981e	1981f	1981g	1981h	1981i	1981j	1981k	1981l	1981m	1981n	1981o	1981p	1981q	1981r	1981s	1981t	1981u	1981v	1981w	1981x	1981y	1981z	1982a	1982b	1982c	1982d	1982e	1982f	1982g	1982h	1982i	1982j	1982k	1982l	1982m	1982n	1982o	1982p	1982q	1982r	1982s	1982t	1982u	1982v	1982w	1982x	1982y	1982z	1983a	1983b	1983c	1983d	1983e	1983f	1983g	1983h	1983i	1983j	1983k	1983l	1983m	1983n	1983o	1983p	1983q	1983r	1983s	1983t	1983u	1983v	1983w	1983x	1983y	1983z	1984a	1984b	1984c	1984d	1984e	1984f	1984g	1984h	1984i	1984j	1984k	1984l	1984m	1984n	1984o	1984p	1984q	1984r	1984s	1984t	1984u	1984v	1984w	1984x	1984y	1984z	1985a	1985b	1985c	1985d	1985e	1985f	1985g	1985h	1985i	1985j	1985k	1985l	1985m	1985n	1985o	1985p	1985q	1985r	1985s	1985t	1985u	1985v	1985w	1985x	1985y	1985z	1986a	1986b	1986c	1986d	1986e	1986f	1986g	1986h	1986i	1986j	1986k	1986l	1986m	1986n	1986o	1986p	1986q	1986r	1986s	1986t	1986u	1986v	1986w	1986x	1986y	1986z	1987a	1987b	1987c	1987d	1987e	1987f	1987g	1987h	1987i	1987j	1987k	1987l	1987m	1987n	1987o	1987p	1987q	1987r	1987s	1987t	1987u	1987v	1987w	1987x	1987y	1987z	1988a	1988b	1988c	1988d	1988e	1988f	1988g	1988h	1988i	1988j	1988k	1988l	1988m	1988n	1988o	1988p	1988q	1988r	1988s	1988t	1988u	1988v	1988w	1988x	1988y	1988z	1989a	1989b	1989c	1989d	1989e	1989f	1989g	1989h	1989i	1989j	1989k	1989l	1989m	1989n	1989o	1989p	1989q	1989r	1989s	1989t
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